RESEARCH PROGRAM ON Livestock and Fish

Brief 19

More meat, milk and fish by and for the poor *December 2016*

The CLEANED Excel tool to assess the environmental impacts of livestock production

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The CLEANED (Comprehensive Livestock Environmental Assessment for Improved Nutrition, a Secured Environment and Sustainable Development along Livestock and Fish Value Chains) Excel tool is a rapid ex-ante environmental impact assessment tool that allows users to explore multiple impacts of developing livestock value chains. It models the impact of changes in the livestock production systems and value chains along two pathways, namely greenhouse gas emissions and soil health.

The CLEANED^X tool was developed as an application of the CLEANED approach/framework developed within the Livestock and Fish CGIAR Research Program. An adapted farm-level version of the tool was extensively tested under the Climate-smart soil protection and rehabilitation project in Benin, Burkina Faso, Ethiopia, India and Kenya within the CGIAR Research Program on Water, Land and Ecosystems. Subsequent refinements were incorporated in the livestock value chain tool presented here.

What does it do?

Livestock value chains in the developing world are expected to expand as a result of population growth and increased demand for animal-source foods from the emerging and growing middle class. Environmental impacts of this intensification will depend on (i) which growth strategies are implemented, for example, genetic improvement, feed improvement or allocating more land and (ii) in which systems these changes will be implemented, and by how many farmers.

For a specific location, the tool aims to illustrate what impacts intensification might have, and how they might vary according to the characteristics of specific livestock production systems. The CLEANED^X tool allows users to explore different growth strategies and quantify the potential impacts at the scale of individual livestock enterprises as well as for the whole value chain.

What's new about the Excel tool?

Traditionally, developing countries lack relevant data necessary to assess environmental impacts which calls for extensive, and often costly, primary data collection. The data requirements for this CLEANEDX tool are relatively low and can be collected locally and rapidly through expert knowledge combined with simple household data collection. It is specifically designed to operate in data-poor environments and to provide quick results, so various scenarios can be explored and results fed into participatory decision-making processes.

Second, by explicitly incorporating different types of livestock enterprises, the CLEANED^X tool accounts for the heterogeneity of livestock production systems within a study area, allowing users to identify which livestock development pathways may have more impact and which may mitigate potential negative impacts of the growth scenarios.

How does it work?

First, a user defines the different types of livestock enterprises found in a study area. This information is typically collected through a participatory GIS exercise. Each of the livestock enterprise types in the area is then characterized in terms of the environmental conditions (soil characteristics, rainfall, length of seasons), herd composition (type and number of livestock), manure management system, feed baskets for dry and wet seasons and the livestock product waste along the value chain. For each feed crop, additional information is collected on any slope in the growing area, how residues are managed and any fertilizer inputs.

Based on the relative importance of the items in the feed basket, the herd's composition and the live weights and productivity of animals, the tool generates the amount of land required to produce each feed crop.

These land requirements are fed through simple mathematical equations that compute parameters for each type of livestock enterprise:

1. For the soil health pathway, it calculates: (a) Soil loss due to water erosion and (b) nitrogen balance (including manure, fertilizer use, atmospheric deposition and N-fixation as input sources as well as crop removal, leaching, loss to atmosphere and erosion as outputs).
2. For the greenhouse gas pathway, it calculates emissions expressed in CO^2 equivalents based on: (a) enteric fermentation, (b) manure management, (c) feed and fodder production, (d) woody biomass production, and (e) land use change (computed based on IPCC Tier 1 and Tier 2 calculations).

Based on the relative importance of the enterprise types in the study area and a user-defined adoption rate, the overall environmental footprints of livestock value chains in the study area are then calculated.

This process can be repeated for different scenarios (e.g. expansion of a certain livestock enterprise type, changes in feeding practice, herd composition or animal performance, and reduction of waste) and resulting footprints compared.

Figure 1: Example input sheet

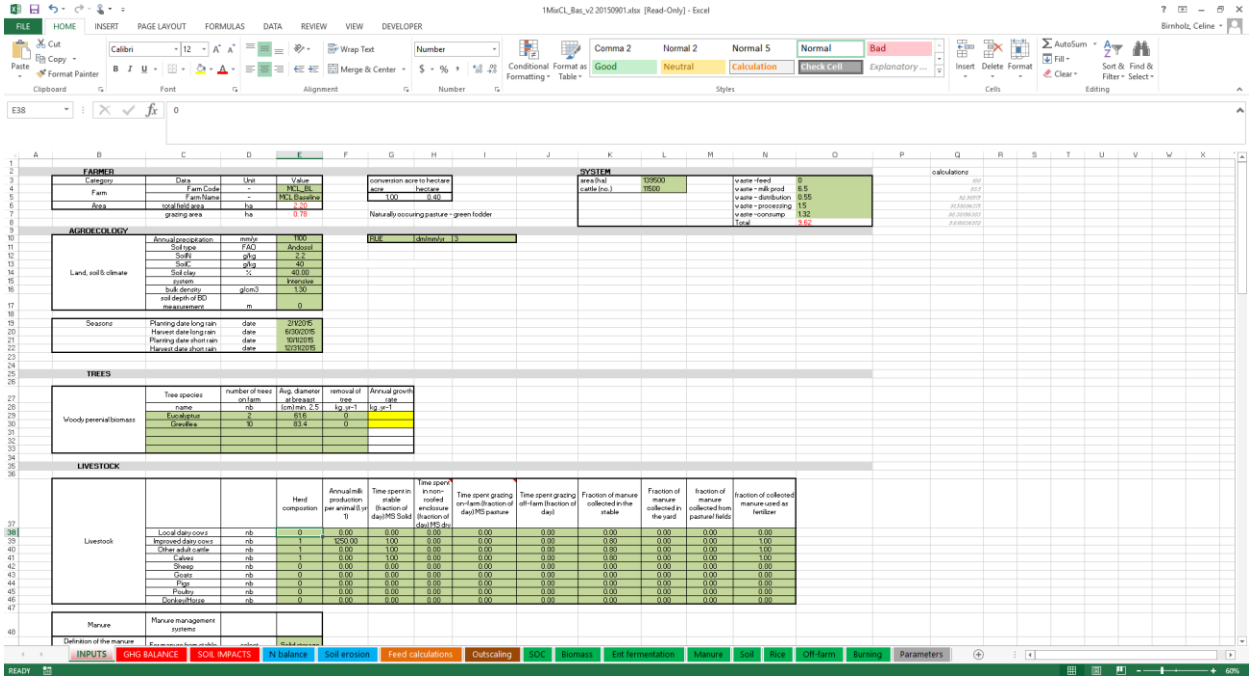
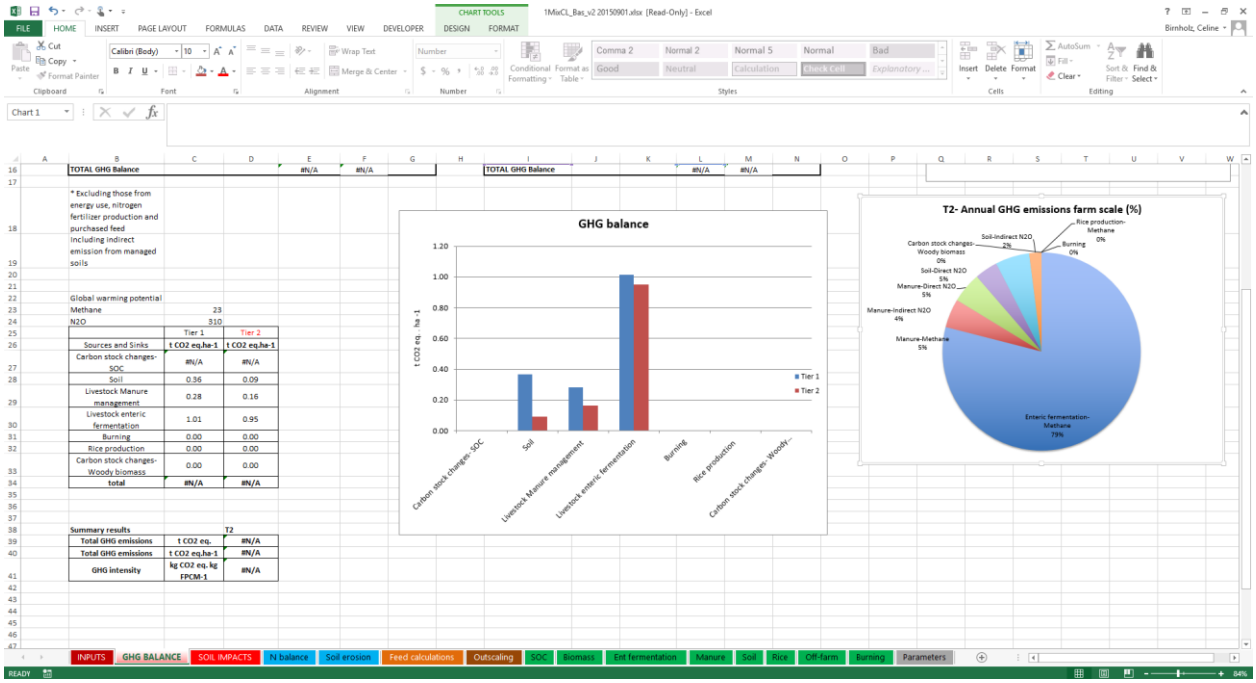


Figure 2: Illustrative greenhouse gas emissions outputs



Credits and more information

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